SCIENCE NEWS-LETTER

The Weekly Summary of Current Science

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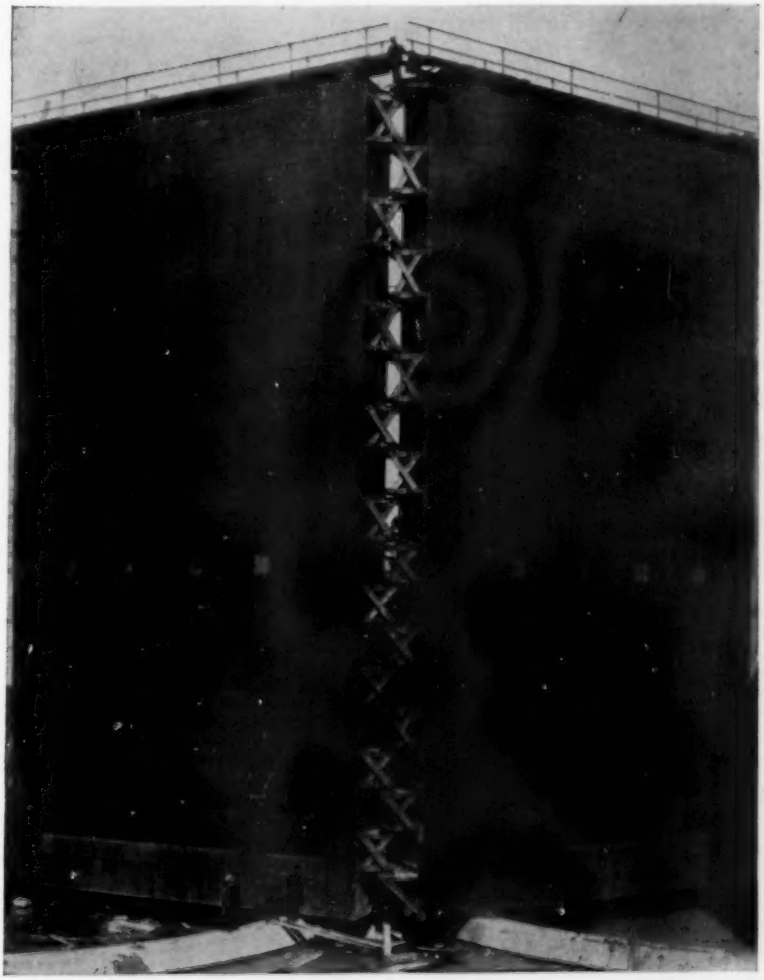

MAMMOTH WELLAND CANAL GATE

Helps Speed Big Lake Vessel Up and Down 325-Foot Hill

(See Page 386)

Vol. XVII No. 480

Racial Leadership Not Permanent

Anthropology

History Shows Procession of "Great Races"

CLAIMS of exclusive racial superiority, for Nordics or for anybody else, were scouted by Prof. Fay-Cooper Cole, anthropologist of the University of Chicago and the National Research Council, in a radio talk given over the Columbia Broadcasting System, under the auspices of Science Service.

Claims to racial superiority, Prof. Cole said, are quite definite things, and can be definitely investigated. If they are true, history will bear them out. But, he continued, history does no such thing; instead, it shows a procession of "Great Races," who succeeded each other through the ages, each people in its turn imagining itself to be the culmination and apex of all human history.

"In the year 2500 B. C., Egypt led the world," said Prof. Cole. "It was further advanced in all the arts and crafts of civilization. Had you asked the Pharaoh of that period if there was a superior race of people he doubtless would have said 'Certainly, and we are it.' At about that time a Mediterranean people were developing a civilization on the island of Crete, but they did not rank with the Egyptians of the time. By the year 1500 B. C., they had progressed far beyond the civilization of the Nile and by every right they could have proclaimed themselves a superior people. This was just at the time the rude barbarians from the north, the tribal kings of the Odyssey and the Iliad, were pushing into Greece. Had you sought to compare these rude herdsmen with the Cretans of the Minoan period you would have been laughed to scorn. Yet they overcame the Cretans, borrowed liberally of their culture, intermarried with them and by the year 500 B. C., this mixed population produced the golden days of Greece. Surely they were the dominant people of that age. By the beginning of our era Rome had wrested the leadership from Greece and was attempting to subdue the rude barbarians of the north. If you wish to learn what the Romans thought of our ancestors in central and northern Europe and in the British Isles, just read again your Cicero and your Cæsar. There was no doubt in the mind of the Roman but that he belonged to the great race. But the northern barbarians showed themselves capable of learning, and ere long they overthrew Roman power and are now the leaders of civilization.

"Apparently then the fact that a nation or race is dominant at any particular time is no assurance that it will retain the leadership. Archæology and history teach us that civilization has shifted from one region and people to another, and that the less advanced people of one period become the leaders in another age.

"The presence of many races and peoples in America does raise real problems, problems requiring the greatest statesmanship and tolerance. Race mixture will continue, we will become more of a hybrid people than we are at present, but if we scan the history of the past, or consider the known facts of race and race mixture, we need have no fear for America of the future."

Science News-Letter, June 21, 1930

Welland Canal

SLIGHTLY more than a century after the falls and rapids of Niagara were first overcome for water transportation by a canal only 8 feet deep, there has been completed on practically the same site a mammoth structure which will pass giant 600-foot lake grain vessels up and down the 326.5-foot difference in elevation between Lake Erie and Lake Ontario in just a few hours time. Although parts of the new Welland Canal have been in use for months, it is to be officially opened on July 1.

The lift of the Panama Canal is only 85 feet. The Welland Canal's 326.5-foot lift is possibly the greatest of major canals and is especially noteworthy because a sharp rise in elevation makes necessary its accomplishment in a very short distance. The total length of the canal is 25 miles.

The present canal is the result of the fourth reconstruction, which cost about $115,000,000. The first was completed in 1829 and had 40 wooden locks, 110 feet long, 22 feet wide and 8 feet deep. In the modern structure only seven locks raise vessels 46.5 feet at a time.

The locks have a usable length of 800 feet and width of 80 feet. They can easily carry vessels of 25-foot draft. Gates 82 feet high, as tall as some in the Panama Canal, are used. One leaf of a gate weighs 454 tons. They are built of structural steel faced with plates and contain hollow drums whose buoyancy helps to balance the heavy structures on their bearings.

Science News-Letter, June 21, 1930

The Answer Is

In This Issue

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New Source of Power Predicted

Engineering

World Nearing Production Limit of Present Methods

MAN has nearly reached the limit of development of steam power and will soon discover a new method of transforming energy to his uses.

This far reaching prediction was made in an address delivered in Berlin this week before thousands of engineers from all parts of the world attending the World Power Conference, by C. F. Hirshfeld, research engineer, of Detroit, Mich.

Scientists can now calculate the limit of power production possible under theory yet to be applied. In fact, they could attain this limit if metals strong enough to stand the increasing pressures and temperatures were available, Mr. Hirshfeld explained.

"If we may judge from human history," he said, "this means that somewhere around the corner of time there lies a radically different process for power development. It means that before we have quite reached the limit of possibilities with present methods the new methods will appear as an undeveloped infant to be fought over and nourished and carried through the period of adolescence."

Mr. Hirshfeld did not attempt to indicate what the predicted development will be. Apparently he was not thinking of power development possibilities which have already been projected, such as the gathering of heat from the sun or the utilization of temperature differences between surface and deep water in the tropics or between sea water and atmosphere in the Arctic to operate a boiler. He said:

"There is no saying whence this new development will come nor from whose hands. But, if we follow the path that man has trod thus far, it ought to come out of the fundamental research now in progress or undertaken in the near future.

"With our inherited ideas regarding matter and energy, corpuscle and wave, continuity and discontinuity all thrown overboard or, at least, so modified as to make them all unrecognizable, we appear to have before us a boiling pot out of which something of epochal significance may arise.

"And it is at least conceivable that this may be something that will make obsolete our present power plants before we have had time to find and commercialize metals which will stand the torture to which we are preparing to subject them."

National leaders interested in power—engineers, executives, financiers and educators—from 49 countries are now pooling their knowledge and experience at the second World Power Conference in session June 16 to 26, in Berlin. The first conference was held in London in 1924.

Steam, water, electric, coal, oil and gas power and their essential influence on modern civilization are being discussed.

A STATISTICAL barometer will soon register every week the condition of business in the United States. The production of electricity will be the unit of measure.

"Electrical production is one of the most accurate, as well as the most immediate, indices of the activity of industry and trade in the United States," William Morgan Carpenter, economist of the National Electric Light Association, told the Conference. "Three-quarters of manufacturing enterprises are now electrified and out of every three horsepower of electric motors, two are operated on power procured from the lines of electric light and power enterprises."

Plans are being worked out for the gathering of these statistics weekly by the National Electric Light Association, the trade association of the electrical industry.

SILENT welding, which joins metal to metal by fusion, has been used either wholly or partially to replace bolting and riveting in nearly a hundred bridges and buildings of the United States.

The tallest building which has been built in this way without the clatter of riveting is an 11-story, 180-foot hotel at Hot Springs, Va., Frank P. McKibben, of the General Electric Co., told the Conference.

Old buildings and bridges have been welded to strengthen rusted and overloaded beams so that the structures will last longer. Nearly all this work on both old and new structures has been done with the electric arc. However, a large steel building has just been completed in which the oxy-acetylene arc was used entirely.

Mr. McKibben said that the atomic-hydrogen method of welding, producing heat greater than that of the electric arc itself has possibilities for extensive use. This method has been employed successfully to join non-ferrous metals or very thin ferrous parts, but it has not been tried extensively in welding the thicker steels of bridges and buildings.

The atomic hydrogen method is almost a combination of gas and electric welding. Inflammable hydrogen gas is forced into an electric arc. The hydrogen molecule immediately breaks up into its two atoms, which reunite to produce an intense heat, exceeding that of the arc itself.

THE United States has 55,000 miles of pipe lines carrying natural gas to a large part of the industries and homes of the country, and some of these lines extend as far as 400 miles from the producing areas, Dr. Gustav Egloff, of Chicago, told the Conference.

Natural gas is taking the lead in the great change in fuel practice now going on in America which is tremendously increasing the use of all kinds of gas, according to Dr. Egloff. Two and a quarter trillion cubic feet of gas valued at $500,000,000 were produced in the oil fields of the United States in 1929. Its fuel value is equivalent to that of more than one-sixth of the coal mined in the country during the same period.

Three-quarters of this great output was natural gas. Petroleum distillation and the cracking process was the source of the remainder and produced a volume equal to that made in all the city gas plants of the country.

The expansion of gas consumption is not seen by Dr. Egloff as a menace to the coal industry, but rather as an enlarged opportunity for it.

"Coal should be carbonized at the mines," he said, "to furnish gas, oil and coke. The oil should be cracked to gas, gasoline and coke; and the coke should be gasified. The two products, gas and gasoline, would be pipe-lined to consuming centers. This process would be an immeasurable gain to the welfare of the nation as it would mean the burning in the cities of nothing but smokeless fuel."

(*Turn to page* 397)

Terraces of Shrunken Lake Tell Story of Egypt a Thousand Centuries Ago

Archaeology

By Frank Thone

EGYPT has always been a name of glamour—the glamour of the mystery that surrounds the immemorially old. When the sons of Jacob fled thither from the famine, Egypt was old; nobody then knew how old. In our own childhood the fame of the first antiquarian researches was just becoming popularly disseminated, and the "more than five thousand years!" assigned to the first Pharaohs had an awesome sound. But soon came a widespread knowledge of the men of the Old Stone Age in Europe, with their estimated antiquity of a hundred thousand years or more, and the glamour of Egypt paled somewhat by comparison.

Now, however, the land of the Nile reclaims her own. New evidence suggests that the oldest of the Old Stone Age peoples were at home in Egypt when northern Europe and eastern North America groaned beneath a mile-thick burden of glacial ice. Beside the high antiquity of these shaggy-haired earliest Egyptians, Cheops and Tut-ankh-Amon are people of only yesteryear, mere schoolboys by comparison. Against this perspective of a thousand centuries or more, their once distant figures move suddenly up into the foreground, not very far back of Christopher Columbus and King Alfred. The valley of the Nile once more holds a history of humankind to as remote a date as we have any certain knowledge that men have been men. And by way of stressing the vanity of expecting more, the geologic record goes back to these earliest known humans with full and closely-written pages—and then sharply breaks off, leaving several fly-leaves at the beginning of the volume most eloquently and emphatically empty.

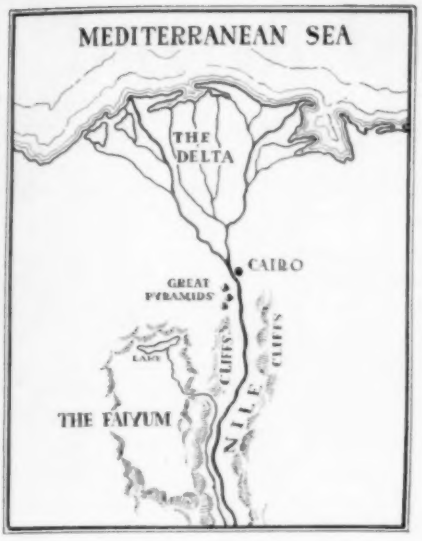
Some hints of this great antiquity of man in Egypt had been obtained years ago. Here and there the rough stone tools that are the usual records of the oldest human beings had been found, but scatteringly and disconnectedly, like bits of torn papyri; readable separately, but lacking the connecting links that would bind them into a continuous chain through the centuries. Now these links have been found and the chain is forged complete.

The tracing of the record of prehistoric man in Egypt is largely the work of two scientists, K. S. Sandford and W. J. Arkell, of the staff of the Oriental Institute, University of Chicago. It is in a way an anticipation of their work, for they went to Egypt with the idea of conducting a comprehensive geological survey of that country, which is needed for a proper understanding of the archaeological work now in progress, and which — astonishingly enough — has never yet been carried out. The search for and dating of traces of ancient man were scheduled to follow.

They were hard at work at "straight geology" well down toward the lower end of the Nile valley when an emergency call took them into the Faiyum. The Faiyum is a curious side valley, a pocket at the bottom of a bowl of desert hills, a fertile oasis connected with the Nile through a narrow gap in the sterile cliffs that wall the ancient river in. Having finished their job there, they decided to stay and do the geology.

It was here, in this isolated side valley, once the gathering-place for the waters of rivers that flowed into the Nile when the desert was a green prairie, that the two geologists began to pick up the connected chapters of the surprising record, one chapter on each of a series of ancient terraces cut by the lake that once filled the valley, now rising like steps up the sides of the dry hills. Then they went out through the water-gap that connects the Faiyum with the Nile valley itself, and found corresponding terraces both in the gap and on the sides of the Nile gorge.

It seems paradoxical at first glimpse to learn that they found the relics of the oldest races on the highest terrace, while the tools and weapons that had belonged to the most recent of the prehistoric civilizations were buried in the silts and sands on the valley floor, which had once been the old lake bottom. We have become so used to the idea of the oldest things being at the bottom and the newest on top that this seems like



Sketch map showing relation of the Faiyum to Lower Egypt.

a completely upside-down arrangement.

The key to the paradox lies in the fact that the waters of the Faiyum have gone down by steps. Ages ago, before the coming of the glaciers to the northern world, there was no Faiyum basin and no Nile valley. A great river, the ancestor of the present Nile, wandered northward toward the sea across a high plateau, and rivers from the then well-watered but now desert Libya flowed into it. One important set of watercourses joined the Nile through what is now the Faiyum.

As rivers are wont to do, these ancient streams cut their channels deeper and deeper. They would flow at a given level long enough to carve a well-marked terrace, and then the process of down-cutting would begin again. Five such river terraces have been traced on the hillsides. The lowermost, and the youngest, is broader in its present extent than the rest and gives evidence of having endured much longer than they.

It is on the lowermost of these ancient river terraces that Dr. Sandford and Dr. Arkell found the first signs of human occupancy of the valley. The upper terraces were barren; no chipped flint was there, nor any other sign that man had ever made his home on them. Through all the ages of their building, the Nile flowed northward to the sea, unobserved by any human eye. But while the last terrace was in the making, there were human eyes a-plenty, and human hands hard at work, as the flint implements bear testimony.

These are described by the two scientists as being of the types known in Europe as "Chellean" and "Acheulean," from the French names of the places where implements of this particular workmanship were first found. Chellean stone tools are the crudest and roughest of any flints which can be called man-worked, at least with any real confidence. If there were any human beings older than the Chellean workmen, they did not know much about the technique of flaking flint.

The next chapter of man's history in Egypt, as told by the flints, is labelled "Mousterian" in the catalogs of archaeologists. The name is again derived from a place in France, where stone tools of this type were first discovered. There are plenty of Mousterian implements on the sixth terrace system in the Faiyum, and a goodly number have been found also at a corresponding level around the corner in the Nile valley.

Mousterian flints, though still rather rough-looking, show a considerable advance in technique over the two earlier types. The men who made them had become really skillful in knocking off sharp-edged flakes of flint at a single blow, and using them as knives, chisels and scrapers. A generation or so ago, a noted German scientist liked to call a hypothetical race of men of this period by the derogatory title *"Homo stupidus,"* but as knowledge has accumulated about Mousterian man the name has become more and more ill-fitting. He was anything but stupid, considering what he had to go on.

About Mousterian man we have not merely the record of his workmanship in stone; we can get a pretty good idea of what he looked like himself. For the man who made the Mousterian implements was the well-known Neanderthaler, often shown somewhat unflatteringly in the "restorations" which artists and sculptors have built over his bones. He is shown low-browed and brutal-faced, shambling on bowed legs, his back always in a stoop. Well, he wasn't as pretty as modern man, probably, but his skill in cracking the toughest of common stones into the kinds of tools he wanted mark him as well above the level of the semi-ape to which some popularizers have endeavored to assign him. He had no chin to speak of, and a very much beetle-browed skull; but inside his cranium he carried a brain about equal in cubic content your own.

Mousterian man's implements have been found in plenty in Egypt, but of their makers as yet not one bone. It may be that the makers and users of these tools were not Neanderthalers at all. They have been everywhere else, but that is no guarantee that such was the case here. A given type of tool does not argue a given race in the user: witness modern Mongolians, Hottentots and Fiji Islanders driving Ford automobiles. But there is a hint that the men of the Mousterian culture in Egypt were also Neanderthalers in the recent discovery of an unmistakable Neanderthal young man's skeleton at Capernaum in Palestine.

During the many thousands of years of Mousterian man's first development in the Faiyum an important change took place in the valley. Either the land rose or the sea level sank—it is not certain which—but at any rate the Nile began to flow faster. The valley was rapidly scooped out to a considerable depth, and cut down part way to its present level. Then, due to some geological change of fortune in the valley of the Nile, the river suddenly backed into this side valley, turning it into a vast lake. The Mousterian terrace is no longer a river terrace; it bears every evidence of having been built by a lake, over whose surface violent storms rushed, raising (*Turn to page* 396)

A stone ax used by one of the oldest inhabitants in the land of Egypt. The weapon was grasped by the neck-like end.

Nebulae Hold Sky's "Speed Record"

Astronomy

Apparent Rate of 7,200 Miles a Second Observed

APPARENTLY speeding away from the earth at the rate of 7200 miles a second, a faint group of nebulae just studied by Mt. Wilson Observatory astronomers sets a new astronomical record. Speaking before the Pacific Section of the American Association for the Advancement of Science, meeting at Eugene, Ore., this week, Dr. Edwin P. Hubble and Milton L. Humason told of their studies which make most previously measured astronomical speeds and distances fade into relative insignificance.

The nebulae studied form what is known as the Ursa Major cluster, and are in the bowl of the Great Dipper, near the star under the point where the handle joins the bowl. Though too far away to be studied in detail, each member of the cluster is undoubtedly a swarm of stars, like the milky way system of which the sun is part.

The observatory's 100-inch telescope, largest in the world, was the instrument that revealed this high apparent speed. By making a time exposure of fifty hours, on nine separate nights, a photograph was obtained by Mr. Humason of the spectrum of the brightest nebula in the group. This proved to be similar to the spectrum of the sun. The dark lines crossing it, each indicating the presence of a certain element, were not in the position they would occupy if the light came from a terrestrial source. Instead they were displaced to the red end of the spectrum. Ordinarily such a shift is taken to indicate a motion of the light source away from the earth. Such a motion spreads the light waves out, making them longer, or redder. If the object is approaching, they are squeezed together and made shorter or more violet in color.

On such a basis, the shift observed by Mr. Humason was indicative of a speed of the nebulae away from the earth of 11,500 kilometers (about 7,200 miles) per second. Previously he had discovered some other record high speeds, such as 7,000 kilometers per second for a group in the constellation of Coma Berenices, 5,100 for a group in Perseus, 3,400 for one in Pegasus and 900 for one in Virgo.

For some years Mr. Humason's colleague, Dr. Hubble, has been studying these nebulae in various ways. It was in 1924 that he announced his first results, which solved an astronomical problem of long standing by proving that these spiral nebulae are actual galaxies of stars, beyond our own system. Though this was done with a couple of the very closest of the nebulae, by methods which could not be applied to the fainter, smaller and more distant ones, he found that he could get a determination of their distance from a measurement of their size or brightness. The nebulae all seem to be of roughly the same size. The small clusters consist of small and faint nebulae, so apparently they appear small only because of their great distance. From comparisons of their size, he has determined the distance of those whose "speed" was measured by Mr. Humason.

Even before the study of the Ursa Major cluster was completed, a direct relationship was found between the apparent velocity and the distance; the farther away the faster the recession from the earth. Using this relationship, Dr. Hubble predicted that Mr. Humason would obtain an apparent speed for the group of about 12,000 kilometers per second, corresponding to its distance of 75 million light years. The most distant stars in our own system are of the order of a hundred thousand light years, a light year being equal to about six trillion miles. When the velocity of the Great Bear cluster came out at 11,500 kilometers, the prediction was abundantly justified. As the relationship holds very closely for all the cases which have been studied, it is believd that the method can now be reversed. By measuring the apparent velocity of a nebula, its distance can be determined.

Just what these high speeds mean is not certain. It is not likely that all the spiral nebulae are seeking to depart from the vicinity of our system, nor is it likely that the farthest ones should be invariably the fastest. More probable is the hypothesis that something happens to the light waves as they travel through space, which spreads them out in just the same way as a motion of the source. The curvature of space, proposed by the Einstein theory, by which space itself is curved in higher dimensions, just as a ball is curved in three dimensions, has been given as one cause of such an effect. At the same meeting, Dr. R. C. Tolman, physicist at the California Institute of Technology, discussed the possible causes of the effect.

Further Research on Cold Necessary

WHETHER the conquest of the common cold has been begun by the researches of Dr. J. A. F. Pfeiffer of the University of Maryland Medical School must be answered by further scientific work. As soon as Dr. Pfeiffer's results are published and as soon as he provides other scientists with cultures of the organism to which he attributes colds, independent investigations can be begun to test his conclusions.

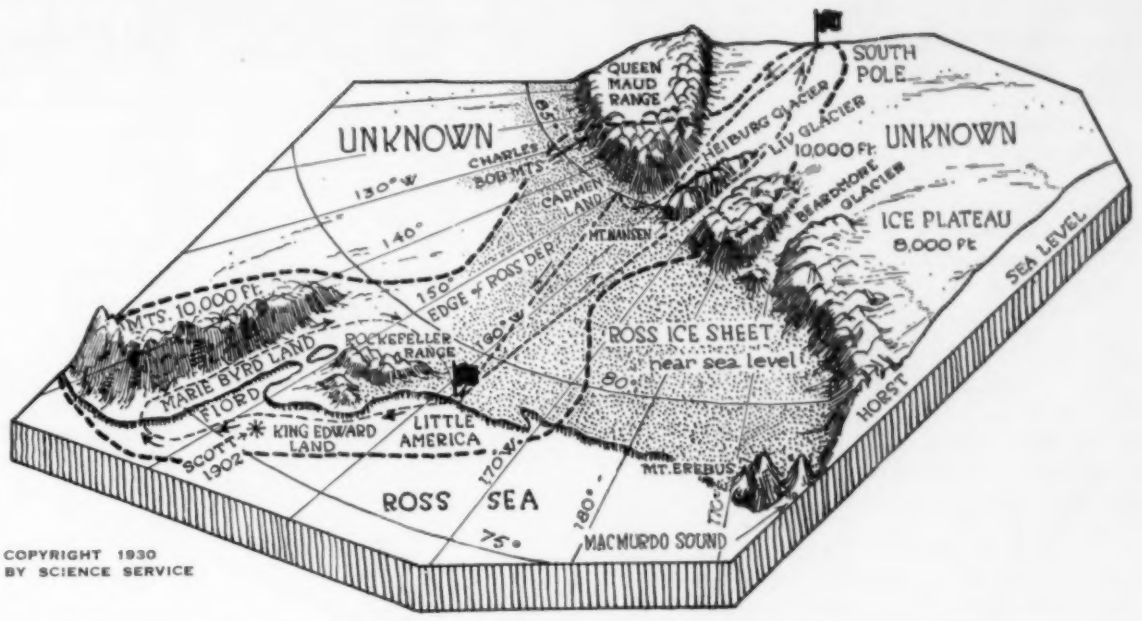
Only when other scientists are convinced of the validity of Dr. Pfeiffer's conclusions will the public be in a position to benefit.

This is the method of scientific research. The annals of medicine are filled with hopeful reports from scientists who believed in good faith that they had solved the problems of troublesome diseases. At least two other germs have been previously credited with causing the common cold. Thousands of dollars are being spent and dozens of investigators are at work on this one problem alone. While much information is accumulating, the cause is not yet known.

Scientists and practising physicians are not at all agreed on the exact nature of a common cold. It has been suggested that just as formerly "fever" was the name given to what we now know as many different diseases, among them typhoid, typhus and tularemia, so the word "cold" may include a number of different diseases of the respiratory organs with similar symptoms. If that is the case, different germs may cause the different diseases now lumped together under the common name of cold.

Dr. Pfeiffer's work has no connection with the studies being made at the Johns Hopkins University under the John J. Abel fund for research on the common cold.

Medicine



Where the Byrd Expedition added to Antarctic knowledge. The heavy dotted line circles the area, over a thousand miles long, which was surveyed by Admiral Byrd. The light dotted lines show the routes of his airplane exploratory trips. This block diagram by Prof. Griffith Taylor is in isometric projection in order that the geography of the area may be better visualized.

Admiral Byrd's Discoveries in Antarctic

Exploration

By Griffith Taylor

Professor of Geography of the University of Chicago, Geologist with Scott's Last Antarctic Expedition.

THE American expedition to the Antarctic which is just returning to America with such a record of success is of special interest in the annals of exploration for a variety of reasons. Perhaps the three outstanding features are the large area of new country surveyed, the new light thrown on major scientific problems and, lastly, the new technique in polar exploration, so far as Antarctica is concerned, which Byrd and Wilkins have developed.

Byrd's major geographical achievement lies in his charting of the eastern portion of the Great Ross Ice Shelf and the adjacent coast. To this he has added the discovery of a large number of new areas of somewhat less importance, since their major features were known from Amundsen's sledge journeys in 1911-1912, or from Scott's voyage early in 1902. The block diagram will make his achievements clear. Before Byrd's explorations, Scott had traversed the front of the Ross Ice Shelf—sailing far along its icy front, which towered one or two hundred feet above the sea. He reached nearly to longitude 150° west where he was blocked by dense pack ice. He sighted the black rocks in King Edward Land (called Scott's Nunataks) and also the adjacent summits of theAlexandria Range. Amundsen in 1911 and 1912 placed his headquarters at Framheim, which was within a mile or two of "Little America" shown on the diagram. His journey to the Pole was as direct as possible. He reached the Plateau by way of the Heiberg Glacier, and attained the Pole on December 14, 1911. He returned the same way. His surveys were not very complete, and of course were confined to a short distance from his track. He made practically no scientific collections. He reported the presence of Carmen Land, which seemed to limit the low-level Ross Ice Shelf on the east about longitude 150° west.

Let us first of all consider the salient results of Byrd's wonderful flight on November 28 and 29, 1929. Leaving at 3:30 p. m., he rapidly crossed the undulating low icy surfaces of the Ross Ice Shelf and then flew up the Liv Glacier which lies somewhat to the west of Amundsen's route. By midnight he reached the Ice Plateau at 10,000 feet. He was at the Pole an hour or so later. He came back via the Heiberg Glacier, and then flew east along the foot of the Great Mountain Scarp to obtain a nearer view of the Charles Bob Mountains, which he discovered and named. He found no land where Amundsen placed Carmen Land, and Dr. Gould corroborated this absence later.

His second great flight was for a distance of about 350 miles to the northeast of Little America. This coastline from King Edward Land to the east was previously entirely unknown until Charcot Land (discovered in 1909) is reached some 1500 miles away. No unknown stretch of the Antarctic shoreline of such extent occurs elsewhere around this huge continent. Byrd's flight last December enabled him to chart 200 miles of new coast, including a great range of mountains separated from King Edward Land by a long fiord or gulf. This new land, lying east of the British Dependency, he calls Marie Byrd Land. The mountains rise to 10,000 feet and the preliminary maps seem to support the view that it is a great scarp or fault-face of the same type as that bounding the Ross Ice Shelf on its western side. About 100 miles from the coast, Byrd discovered the Rockefeller Range between Marie Byrd Land and Little America.

No method of rapid mapping can compare with a photographic survey from the air. At the normal height of flying the camera can photograph a belt of country of the order of 100 miles wide. So that the observer from Byrd's airplane was able to fix with reasonable accuracy the topography in an enormous terrain; where the sledger with his sextant or theodolite would only determine the position of a few of the nearer dominant features. (*Turn to page* 398)

Jewels Tell History

WOMEN of ancient Egypt decorated themselves with strings of colored glass beads cleverly shaped like fruits and flowers, and now, three thousand years later, scientists are collecting these little glass figs and melons and using them in the writing of plant history.

Fig-shaped glass beads, found in Italian tombs of the eighth and ninth centuries B. C., bear out the theory that edible figs were introduced into Europe just about that time, Dr. Gustavus A. Eisen stated in a report to the American Journal of Archaeology.

Dr. Eisen, who combines the study of biology and archaeology, states that fig beads have been found in Syria, Italy, and Egypt. All of them were made, presumably, in Egypt where glass work of this fine and beautiful type was done. The figs represented in glass are modeled from the Arabian or edible fig, he concludes. The Egyptian glass workers, who sought novelties, must have copied their designs from original fruit models. And so, it appears, the Arabian fig was transported from its native home through Syria and introduced to Egypt and the Mediterranean countries near the time that the fig beads first appeared.

The Egyptians seem always to have possessed a taste for beads representing fruits, flowers, domesticated animals, and insects, Dr. Eisen explains. The oldest of these beads were in the form of lotus flowers and melons. By the sixth century B. C. animated beads became the fashion rage in Egypt, and bead makers then introduced such styles as beads shaped like the heads of foreigners, and beads shaped like domestic animals.

Archaeology

Science News-Letter, June 21, 1930

Smallpox

THERE is constant danger of a widespread outbreak of smallpox of virulent type in the United States because of the large number of susceptible persons, statisticians of the Metropolitan Life Insurance Co. state in a review of the situation during the last three years.

Until the number of susceptible persons is greatly reduced by general acceptance of vaccination, there will be no real security against smallpox, the report states.

More cases of smallpox were reported in 1929 from 44 states, the District of Columbia and eight Canadian provinces than in either 1928 or 1927. In Canada alone, there was much less smallpox than in either 1928 or 1927. Over 40,000 cases were reported during 1929 for the two countries, the 44 states and District of Columbia totalling over 38,000. However, for both countries combined, there were fewer deaths from the disease in 1929 than in the two preceding years.

Illinois reported more cases than any other state, but Louisiana, Maine, Georgia and Texas had very many fatal cases. El Paso, Texas, was an outstanding example of what happens when virulent smallpox attacks a community. Here in 1929 there were eleven deaths among 59 cases. If this ratio of deaths to cases had prevailed among the 38,063 persons who had smallpox in 45 American states last years, about 7,100 deaths from this loathsome disease would have resulted.

Medicine

Science News-Letter, June 21, 1930

Useful Weed

A VICTIM of disparagement for many years, dogbane or Indian hemp, a common weed, has at last been given a place in the society of plants of economic value.

Scientific research, according to the Missouri Botanical Garden Bulletin, has revealed that the weed, known scientifically as *Apocynum,* has rich rubber content.

"One of the most significant factors concerning the study of the latex of *Apocynum,*" says the Bulletin, "is that the rubber content increases to a large extent with drought and infertility of the soil."

Botany

Science News-Letter, June 21, 1930

Teotihuacan

SIX new pyramids in a row have been unearthed along the "Pathway of the Dead," at the ancient Toltec city of Teotihuacan. Mexican archæologists, working there under the direction of José Reygadas Vertiz, have made the first excavations at the site since 1924.

The new-found pyramids are small compared to the giant pyramids to the Sun and Moon for which Teotihuacan is famous, but they have many remarkable features. Stumps of the old temple walls which once surmounted the pyramids have been located, also broken pillars and several of the central altars and braziers. The walls mark the arrangement of rooms and show that several of the temples had inner sanctuaries entered through maze-like passageways.

Each pyramid has its grand stairway in front looking toward the west, facing the avenue. The first two and last three pyramids are joined at the lower level. The last pyramid connects with the Temple of Tlaloc, so-called because numerous figures of the rain god, Tlaloc, have been found there.

Drainage canals of concrete covered with stone slabs have been found along the street, showing that the inhabitants of the city provided an outlet for the rain that would have flooded the avenue in the rainy season.

All outward signs indicate that when the other side of the street is excavated there will be found a symmetrical series of buildings on the two sides. The avenue is named the "Pathway of the Dead" because the rounded mounds along either side of the great street were once believed to be tombs.

Teotihuacan is of unknown age and history. The Azetcs who met the Spanish conquerors in the sixteenth century could tell nothing of its origin.

Archaeology

Science News-Letter, June 21, 1930

IN VARIOUS FIE

Gorilla Grows Slowly

A YOUNG male gorilla grows more slowly than a boy of the same age. So reports Dr. C. V. Noback of the New York Entomological Society, who has made a detailed study of a youthful gorilla received at the New York zoo some time ago. The rate of growth during the first three years of life was measured in terms of adult weight. Possibly correlated with this slower growth is the fact that the bones and teeth of the gorilla mature more rapidly than those of a human child. The animal reported in Dr. Noback's study had its full set of milk teeth at approximately eighteen months, and began to acquire permanent teeth at two and one-half years.

Zoology

Science News-Letter, June 21, 1930

Penetrating Heat

A YOUNG research fellow at the California Institute of Technology has been conducting experiments on the penetration of the flesh by radiation. He is Hawley Cart-

IENCE FIELDS

wright and he has discovered that only a small range of the rays, those with wavelengths lying between 7000 and 14,000 Angstrom units (one ten-millionth of a millimeter) will shine through animal tissue. The visible rays, the ultraviolet, and some of the infra-red become lost in the flesh and fail to shine through. The significance of this is that these rays can be used to heat the body internally. Hot water bottles and electric pads are localized heaters compared to these infra-red rays that penetrate the flesh and heat it internally.

Mr. Cartwright placed a high temperature bulb inside his mouth and with a spectrograph he tested the colors, the wavelengths, that penerated his cheeks. His tests were simple and conclusive.

A concentrated beam of light was made to shine through his cheek into a spectrometer. With a special vacuum thermo-couple, he then measured the energy of the various colors, visible and invisible. A greater part of the infra-red rays penetrated through his cheeks than all other radiation. Infra-red rays are not chemical in their effect but they are merely heat rays that are now found to shine into the flesh. The experiments may lead to new research and possibly to new or perfected therapeutic lamps.

Physics

Science News-Letter, June 21, 1930

Metal Fatigue

THE "unknown" cause of the few airplane crashes in which motors fail for no apparent reason is often metal fatigue at hidden imperfections, frequently the inevitable result of parts vibrating in unison and thus multiplying to the breaking point the strains they bear.

A device with magnetic eyes which penetrates the interior of steel parts now finds these minute defects where fatigue occurs, but the vibration danger still exists.

"It is what broke three crankshafts during a single flight of the Graf Zeppelin while the fourth did not quite reach the point of failure," said Roland Chilton, consulting engineer, of Patterson, N. J., in a recent report to the American Society of Automotive Engineers. "The same thing happens when glass bowls are shattered by striking a synchronous piano note," Mr. Chilton explained.

The usual remedy is to "beef up" the crank shaft, not to make it stronger, but to bring its period of vibration above the operating speed of the engine, it was pointed out.

Another cause of failure at slight interior defects is the continuous vibrating of so-called rigid parts, the engineer said. The movement is as much as two-thousandths of an inch in a distance of one inch. Thus the fixed parts of the engine act very much like springs.

But the magnetic induction analyzer is coming into greater use to find the hidden weak spots which would pass visual and stationary testing and is overcoming difficulties of both kinds of vibration, according to Mr. Chilton.

"This machine detects hair cracks, inclusions, segregation, and other defects in bar stock, which is fed rapidly through induction coils, and incidentally excites in anyone who watches it a decided preference for engines built from stock so selected,"

Engineering

Science News-Letter, June 21, 1930

Flood Control

TOWARD the end of the 71st Congress, the Mississippi flood control problem will be nearer a satisfactory solution than ever before, recent hearings of the House Flood Control Committee indicate.

Complaints from owners of land in the artificial spillways being constructed under the Jadwin plan are expected to be satisfied by the passage of the Wilson bill under which compensation will be paid for water rights over these lands.

The exhaustive study of the river and its tributaries ordered by President Hoover, which includes surveys for possible reservoirs, spillways, levees, water power and navigation, will be farther under way.

Even now information brought out before the Committee points to a combination of the Jadwin plan of artificial spillways and the reservoir system provided for in the Sears bill as the final means of protecting the lowlands.

Levees and spillways would be built on the lower river where they are needed most. At the same time the water entering the Mississippi would be controlled by reservoirs on the headwaters of the tributaries. Natural lake sites would be picked for the reservoirs so their cost will be low.

Hydraulic Engineering

Science News-Letter, June 21, 1930

Deaf Men's Minds

THE individual who loses his hearing entirely, or even partially, is in danger of falling into one of two unhappy states. Either he may become sadly depressed, or else he may become suspicious.

Which way the deafened person is most likely to fall depends on his own personality, Dr. Ruth Brickner, of New York, told the Federation of Organizations for the Hard of Hearing.

The person who becomes suspicious is the type known to psychiatrists as a narcissistic person, because of his strong tendency to self-love. Such a man has always been unable to accept criticism, Dr. Brickner explained. He could not be wrong, and yet frequently complains of injuries and slights. He cannot accept, or even believe, that he has become the victim of a serious disorder, and so when he gets into difficulties through his defective hearing he is quick to accuse the world of persecution and ridicule.

The man who becomes depressed is the type who has always gone through life feeling dissatisfied with his achievements and highly critical of himself. He has been unable to develop what Dr. Adolf Meyer so aptly calls "resting points of satisfaction," Dr. Brickner showed. Such a man may rage at his deafness which restricts his freedom, but his rage takes the form of self-hatred.

Both types, if the condition becomes acute, shut themselves away from other people, the first because he suspects people of being unfair to him, and the second because he dislikes to trouble others with his conversational handicap. Extreme personality types and extreme reactions to deafness are not common, but each individual needs to recognize the tendencies and where they may lead, it was shown.

Study of lip reading was recommended by Dr. Brickner as the first prerequisite to overcome isolation in deafness. Human beings happen to be social beings, she stressed. Some deafened persons achieve success in social contact with other deafened persons, and in familiar environment, but become panic-stricken when they have to talk with hearing people. Others attain the greater victory of mingling securely with the deafened and with hearing people alike.

Psychology

Science News-Letter, June 21, 1930

The Fate of Sir John Franklin — A Classic of Exploration

Geography

THE VOYAGE OF THE 'FOX' IN THE ARCTIC SEAS. A Narrative of the Discovery of the Fate of Sir John Franklin and his Companions. By Captain M'Clintock. London: 1859.

From the time that Sir John Franklin, experienced Arctic explorer, went into the unknown waters north of North America with the ships "Erebus" and "Terror" in 1845 to search for the "North-west Passage" around the western continent, and did not return, the mystery of his disappearance caused expedition after expedition to be sent out by the British Admiralty to search for clues to his fate. It is to these expeditions that much of our knowledge of the Arctic is due. Many traces of the vanished explorers were found, but definite information of their fate was still lacking. Lady Franklin then dedicated her own fortune and all the money she could raise by subscription to another attempt to learn the cause of the expedition's failure, and Capt. M'Clintock, in the years 1857-59, was fortunate enough to find documentary evidence in a cairn which the Eskimos had not discovered.

ONE thing is certain, the wild sort of tent-life we lead in Arctic exploration quite unfits one for such tame work as writing up a journal; my present attempt will illustrate the fact,—yet with such ample materials what a deeply interesting volume might be written! Since I last opened this familiar old diary—the repository alike of dry facts and the most trivial notes—winter has passed away, summer is far advanced, and the glorious sun is again returning southward. We too have endeavoured to move on with the times and seasons.

As for myself—I have visited Montreal Island, completed the exploration and circuit of King William's Island, passing on foot through the only feasible North-West Passage; but all this is as nothing to the interest attached to the *Franklin records* picked up by Hobson, and now safe in my possession! We now know the fate of the "Erebus" and "Terror." The sole object of our voyage has at length been completed, and we anxiously await the time when escape from these bleak regions will become practicable. . . .

About 12 miles from Cape Herschel I found a small cairn built by Hobson's party, and containing a note for me. He had reached this, his extreme point, six days previously, without having seen anything of the wreck, or of natives, but he had found a record—the record so ardently sought for of the Franklin Expedition—at Point Victory, on the N. W. coast of King William's Land.

That record is indeed a sad and touching relic of our lost friends, and to simplify its contents, I will point out separately the double story it so briefly tells. In the first place, the record paper was one of the printed forms usually supplied to discovery ships for the purpose of being enclosed in bottles and thrown overboard at sea, in order to ascertain the set of the currents, blanks being left for the date and position; any person finding one of these records is requested to forward it to the Secretary of the Admiralty, with a note of time and place; and this request is printed upon it in six different languages. Upon it was written, apparently by Lieutenant Gore, as follows:

> 28 of May, 1847. H. M. ships "Erebus" and "Terror" wintered in the ice in lat. 70° 05′ N., long. 98° 23′ W.
> Having wintered in 1846-7 at Beechey Island, in lat. 74° 43′ 28″ N., long. 90° 39′ 15″ W., after having ascended Wellington Channel to lat. 77°, and returned by the west side of Cornwallis Island.
> Sir John Franklin commanding the expedition.
> All well.
> Party consisting of 2 officers and 6 men left the ships on Monday 24th May, 1847.
> Gm. Gore, Lieut.
> Chas. F. Des Voeux, Mate.

There is an error in the above document, namely, that the "Erebus" and "Terror" wintered at Beechey Island in 1846-7,—the correct dates should have been 1845-6; a glance at the date at the top and bottom of the record proves this, but in all other respects the tale is told in as few words as possible of their wonderful success up to that date, May, 1847.

We find that, after the last intelligence of Sir John Franklin was received by us (bearing date of July, 1845) from the whalers in Melville Bay, his Expedition passed on to Lancaster Sound, and entered Wellington Channel, of which the southern entrance had been discovered by Sir Edward Parry in 1819. The "Erebus" and "Terror" sailed up that strait for one hundred and fifty miles, and reached in the autumn of 1845 the same latitude as was attained eight years subsequently by H. M. S. "Assistance" and "Pioneer." Whether Franklin intended to pursue this northern course, and was only stopped by ice in that latitude of 77° north, or purposely relinquished a route which seemed to lead away from the known seas off the coast of America, must be a matter of opinion; but this the document assures us of, that Sir John Franklin's Expedition, having accomplished this examination, returned southward from latitude 77° north, which is at the head of Wellington Channel, and re-entered Barrow's Strait by a new channel between Bathurst and Cornwallis Islands.

Seldom has such an amount of success been accorded to an Arctic navigator in a single season, and when the "Erebus" and "Terror" were secured at Beechey Island for the coming winter of 1845-6, the results of their first year's labour must have been most cheering. These results were the exploration of Wellington and Queen's Channel, and the addition to our charts of the extensive lands on either hand. In 1846 they proceeded to the south-west, and eventually reached within twelve miles of the north extreme of King William's Land, when their progress was arrested by the approaching winter of 1846-7. That winter appears to have passed without any serious loss of life; and when in the spring Lieutenant Gore leaves with a party for some especial purpose, and very probably to connect the unknown coastline of King William's Land between Point Victory and Cape Herschel, those on board the "Erebus" and "Terror" were "all well," and the gallant Franklin still commanded.

But, alas! round the margin of the paper upon which Lieutenant Gore in 1847 wrote those words of hope and promise, another hand had subsequently written the following words:

April 25, 1848.—H. M. ships "Terror" and "Erebus" were deserted on the 22nd April, 5 leagues N. N. W. of this, having been beset since 12th September, 1846. The officers and crews, consisting of 105 souls, under the command of Captain F. R. M. Crozier, landed here in lat. 69° 37′ 42″ N., long. 98° 41′ W. Sir John Franklin died on the 11th June, 1847; and the total loss by deaths in the expedition has been to this date 9 officers and 15 men.

(Signed) James Fitzjames,
Captain H. M. S. Erebus.
(Signed) F. R. M. Crozier,
Captain and Senior Officer.

and start (on) to-morrow, 26th, for Back's Fish River.

This marginal information was evidently written by Captain Fitzjames, excepting only the note stating when and where they were going, which was added by Captain Crozier.

There is some additional marginal information relative to the transfer of the document to its present position (viz., the site of Sir James Ross's pillar) from a spot four miles to the northward, near Point Victory, where it had been originally deposited by the *late* Commander Gore. This little word *late* shows us that he too, within the twelvemonth, had passed away.

In the short space of twelve months how mournful had become the history of Franklin's expedition; how changed from the cheerful "All well" of Graham Gore! The spring of 1847 found them within 90 miles of the known sea off the coast of America; and to men who had already in two seasons sailed over 500 miles of previously unexplored waters, how confident must they then have felt that that forthcoming navigable season of 1847 would see their ships pass over so short an intervening space! It was ruled otherwise. Within a month after Lieutenant Gore placed the record on Point Victory, the much-loved leader of the expedition, Sir John Franklin, was dead; and the following spring found Captain Crozier, upon whom the command had devolved, at King William's Land, endeavouring to save his starving men, 105 souls in all, from a terrible death by retreating to the Hudson Bay territories up the Back of Great Fish River.

A sad tale was never told in fewer words. There is something deeply touching in their extreme simplicity, and they show in the strongest manner that both the leaders of this retreating party were actuated by the loftiest sense of duty, and met with calmness and decision the fearful alternative of a last bold struggle for life, rather than perish without effort on board their ships; for we well know that the "Erebus" and "Terror" were only provisioned up to July, 1848. . . .

BRIEF as these records are, we must needs be contented with them; they are perfect models of official brevity. No log-book could be more provokingly laconic. Yet, that *any record at all* should be deposited after the abandonment of the ships, does not seem to have been intended; and we should feel the more thankful to Captains Crozier and Fitzjames, to whom we are indebted for the invaluable supplement; and our gratitude ought to be all the greater when we remember that the ink had to be thawed, and that writing in a tent during an April day in the Arctic regions is by no means an easy task.

Besides placing a copy of the record taken away by Hobson from the cairn, we both put records of our own in it; and I also buried one under a large stone ten feet true north from it, stating the explorations and discoveries we had made.

With respect to a *navigable* North-West Passage, and to the probability of our having been able last season to make any considerable advance to the southward, had the barrier of ice across the western outlet of Bellot Strait permitted us to reach the open water beyond, I think, judging from what I have since seen of the ice in the Franklin Strait, that the chances were greatly in favour of our reaching Cape Herschel, on the S. side of King William's Land, by passing (as I intended to do) eastward of that island.

The wide channel between Prince of Wales' Land and Victoria Land admits a vast and continuous stream of very heavy ocean-formed ice from the N. W., which presses upon the western face of King William's Island, and chokes up Victoria Strait in the manner I have just described. I do not think the North-West Passage could ever be sailed through by passing westward—that is, to windward—of King William's Island.

If the season was so favourable for navigation as to open the northern part of this western sea (as, for instance, in 1846, when Sir J. Franklin sailed down it) I think but comparatively little difficulty would be experienced in the more southern portion of it until Victoria Strait was reached. Had Sir John Franklin known that a channel existed eastward of King William's *Land* (so named by Sir John Ross), I do not think he would have risked the besetment of his ships in such very heavy ice to the westward of it; but had he attempted the northwest passage by the *eastern* route, he would probably have carried his ships safely through to Behring's Straits. But Franklin was furnished with charts which indicated no passage to the eastward of King William's Land, and made that land (since discovered by Rae to be an island) a peninsula attached to the continent of North America; and he consequently had but one course open to him, and that the one he adopted.

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M'Clintock's party on the Arctic ice with one of their unruly dog teams and another sledge pulled by men. The engraving is from a drawing made on the expedition by Captain May.

Egypt a Thousand Centuries Ago—*Continued*

huge battering waves that piled gravel and debris in typical beach ridges.

The men who sat on the edge of the ancient lake and hacked their flints were easy-going hunters, for whom life was not over-hard. The laborious agriculture of the modern Nile was far, far off: why eat bread in the sweat of your face when meat can be had by throwing a stone? It is no wonder that so many thousands of years passed without much progress, as we reckon it.

But arduous times were ahead, times which would compel the improvident hunters to begin taking thought for the morrow, what they should eat. For as the ice age in the north began to draw to its close, the rains in the south became less abundant, and the grass on the North African plateau slowly grew shorter and scantier, supporting fewer animals, making hunting more difficult and compelling the population to be more and more dependent on what the immediate neighborhood of their rivers and lakes could yield them.

So we see in the flints of the people who succeeded or developed out of the Mousterians of the lake terrace and river valley evidence that they were less and less hunters after big game in the open and more and more fishers on the shore and trappers in the marshes. Their implements were not so large as those of the Mousterian population had been, nor adapted to such lusty blows. Their flakes, becoming ever smaller, displayed great cunning nevertheless; though they are not to be compared with the probably contemporaneous tools and weapons used by Crô-Magnon men in Europe, where game was still abundant.

Down to the end of the Mousterian, there is a close similarity in shape and type of workmanship between the flints of Europe and those of Egypt. But after the close of that period the Egyptian craftsmanship developed on wholly independent and divergent lines from that of the North. For this reason, Dr. Sandford and Dr. Arkell do not use the culture-names made familiar from European studies: Aurignacian, Solutrean, Magdalenian, and so on. For the culture of the two lakes terraces next below the Mousterian they adopt an entirely new name, (first used by Vignard) native to Egypt as the tools it characterizes were. They call it the Sebilian.

At the end of the ice age, radical changes took place in river and lake, and were reflected in the character of the prehistoric population. In the first place, the Nile began to flow toward the sea much more rapidly, though much diminished in volume. This cut down its valley once more, making the river lower than the lake. The lake accordingly reversed its age-long direction of flow; it drained into the river again, and its bottom was eroded down to its present level. Real desert conditions were settling down in good earnest over the stony uplands, and the people were hemmed in with increasing strictness. Harder and harder became the hunting, more and more was it necessary to depend on what the river brought. The Nile only awaited the invention of agriculture to assume its historic role as the Father of Egypt.

With the onset of "modern" time—in the geologic sense—the drama was completed rapidly and inevitably. Another change in either the crust of the earth or the level of the sea slowed down the dwindling river from a rushing, gravel-bearing, channel-eroding stream to its present character of sluggish, often-overflowing, silt-depositing river, building up a floodplain and delta of soil so incredibly rich that it can be farmed with a crooked stick and still yield a living crop. So farming began there perhaps ten thousand years ago, and so it continues to this day. Where tractors and gang-plows have invaded Egypt it is the result of Occidental impatience and hustle, not of the Oriental calm and philosophic serenity native to the land.

But to return to our Nile. The same geologic changes that slowed its flow, probably, dropped the level of the Faiyum basin until its bottom was below sea level. The river naturally did what it had done at a higher stage at the beginning of Mousterian time, and filled up the lake again.

But it did not fill it up so high this time. The lake grew large, but it was only a lake at the heart of a big valley that had once contained a veritable inland sea. This lake survived into historic times, though one of the first of the great public works of the Pharaohs was to build a dam across its connection with the Nile, and so control its level.

There are four terraces marking where four stages of this ancient lake level stood. These again bear reminders of the works of man, but they are of a different order. The Paleolithic, the Old Stone Age, was at an end; the stones of the newer terraces are more delicately chipped, often polished, and they have pieces of a new stuff mixed with them—pottery, the unmistakable mark of the New Stone Age, the Neolithic. It is not long now until occasional bits of copper are due, then bronze, then the strange marks that represent ideas and usher in the dawn of history.

The gap caused by the rapid erosion and subsequent silting up of the valley is the moment of darkness that marks the fall of the curtain. The Old Stone Age had played out its epic drama on the successive terrace-stages that mark the circling hills like steps: a Descent of Man in the truest, most literal sense. The first polished stone blade, the first potsherd, that whispers "Neolithic" to the searching archaeologist is the cue for the prelude to a new play, the drama of History.

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Gorilla Takes 5,600 Mile Auto Ride

Zoology

Fifth Specimen in America Lands at Camden

A 5600-mile ride in an automobile, all over equatorial Africa, was just a preliminary trip before a long ocean voyage that brought him to America, for a husky young male gorilla that was landed at Camden, N. J., by Julius Buck and his son Warren Buck. The Bucks are hunters and importers of rare wild animals, and in addition to the gorilla "boy," the prize specimen of their present cargo, they have a large number of valuable apes and snakes.

The young gorilla was taken in the Congo during the early stages of their recent expedition, so that it was necessary for his captors to carry him with them during all of their subsequent wanderings. He became very tame, and was quiet and affectionate as all captured young gorillas are said to be, so that he gave no trouble during his long journey. His amiable disposition has continued since his landing on this side, so that it has not been necessary to chain or cage him. This makes it possible to study his behavior with much less restriction.

The gorilla that rode all over Africa in an automobile, with one of his captors, Warren Buck of Camden, N. J.

Dr. Adolph Schultz, of the Johns Hopkins University, has done considerable work on the growth of anthropoid apes, with especial reference to the growth and shedding of their milk teeth. Since no gorillas have ever been born in captivity, the ages of the animals under observation have always been in question, and each new specimen makes it possible to gather more definite data.

The new specimen brought in by the Bucks makes the total number of gorillas in this country now five. The most recent previous importation was brought over on the Graf Zeppelin last year. Julius Buck already has one successfully acclimated gorilla specimen to his credit—little "N'gi," who lives at the National Zoological Park at Washington, D. C.

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World Power Conference—*Continued*

WHEN Engineers have made the largest electric generators possible, they will be able still further to increase the capacities of the huge machines another 25 per cent. by running them in an atmosphere of hydrogen gas.

The light, inflammable gas has already been used successfully with a small enclosed generator, M. A. Savage of the General Electric Co., told the World Power Conference. Engineers have learned from its operation how to apply hydrogen to the largest units.

"These data indicate that large generators can be built with efficiencies at rated load six-tenths of one per cent. higher when operating in hydrogen and that the active magnetic material can be reduced some 25 per cent. for the same kilowatt output," Mr. Savage said. "Expressing this in another way, machines of 25 per cent. greater output will ultimately be possible when the limit in capacity is reached in air cooled generators.

"Hydrogen cooling is a perfectly practical thing and its adoption will mark the next big step in the increase in efficiency of these large units."

Although an increase in efficiency of only six-tenths of one per cent. seems very insignificant, if applied to the world's largest generator, it would mean an additional capacity of more than 1,200 horsepower. The capacity of this one unit exceeds 200,000 horsepower and operates at an efficiency of about 98.5 per cent.

Hydrogen is more desirable than air as an atmosphere for generators because it reduces one of the machines' greatest losses, that caused by wind resistance. Hydrogen has only one-fourteenth the density of air. Just as it is easier for a cook to stir water than a thick cake batter, so the rotor of a generator turns more readily in hydrogen than in air.

THE widely heralded efficiency of the United States was measured before the other nations of the world in a paper presented by F. G. Tryon, of the Brookings Institution and the U. S. Bureau of Mines.

In the United States the production of electricity from coal has become 400 per cent. more efficient than it was in 1902, Mr. Tyron said. Six pounds of coal were required to produce one kilowatt of electrical energy in 1902, 3.3 pounds in 1917, and 1.76 pounds in 1928.

A railroad train runs now 40 per cent. farther on a ton of coal than it did 30 years ago. A ton of steel is made by the consumption of a third less coal and the manufacture of a barrel of cement requires 20 per cent. less than was needed just 20 years ago.

Progress will continue, Mr. Tryon believes, both through new inventions and through the bringing of average performance closer to the level of what best performance has already proved feasible.

"The most efficient central station," he explained, "requires only nine-tenths of a pound of coal per kilowatt hour, or barely half as much as the average for all stations. The best steam locomotives in use require only 70 pounds of coal per 1,000 gross ton-miles, as against an average of 127 for all locomotives."

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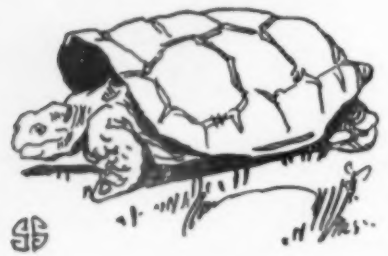
Nature Ramblings

By Frank Thone



Galapagos Tortoises

ABOUT a hundred years ago a young naturalist scrambled around among the rocks on the shores of the Galapagos islands, south of Panama and west of Ecuador. He was having the time of his life, for almost every animal and plant he saw was a species new to him. Reflecting on the possible why and wherefore of this island life being so different from that of the nearby mainland, he was hit right between the eyes with a big idea.

Not being a precipitate young man, Charles Darwin went home and incubated this big idea for forty years before he let it loose in print, to startle the world and revolutionize biology and philosophy.

One of the first things that the young Darwin must have seen on the Galapagos islands were their turtles. He must have seen them very soon, for they are among the biggest things in sight there. The old ones—and nobody knows how old they are—get to have a shell diameter of half a dozen feet, and can carry full-grown men on their backs apparently without effort. They are really monumental reptiles.

There were giant tortoises practically without end when Darwin visited the islands. But there are relatively few of them now. Ecuador has never bothered itself about the conservation of wild life on these offshore possessions, and the ranks of the tortoises have been mercilessly decimated by reckless hunters and by whalers that wanted a big mess of turtle soup for their crews.

So the best chance that the Galapagos tortoises have is in emigration. A few zealous zoöphiles have carried off quite a number of them alive, and they now crawl their indifferent tortoisian ways in the reptile houses of some of the larger zoological parks, where they may be seen by the curious.

The Discoveries of Byrd—*Continued*

Quite apart from the discovery of *new* lands, we may therefore reasonably hope for an accurate reconnaissance by Byrd of a belt of country over 1,000 miles long and perhaps 200 miles wide. Such a piece of charting has never been accomplished by any previous Antarctic Expedition.

Let us now consider the scientific problems which Byrd's expedition has helped to solve. As regards continental structure, the most important result has already been referred to. It seems probable that the low-lying Ross Ice Shelf continues far to the southeast of the limits assigned to it by Amundsen. It is as if Americans had not yet crossed the States, and were in doubt whether there were a low-level route to San Francisco—or whether a rugged topography confronted them. The Ross Ice Shelf is probably an enormous sheet of floating ice, reaching to the foot of the giant scarp of the mountain ranges. This scarp (shown in the diagram) towers to 15,000 feet in places, and represents the edge of a block of the earth's crust. This block or "horst" has been thrust up many thousand feet above sea level. It seems likely that Marie Byrd Land is another horst, in which case the gulf covered by the Ross Ice Shelf is probably an area of subsidence of the nature of a "graben." The Charles Bob Range seems to be an extension to the east of the great horst, while the low-lying area seen by Byrd and later by Gould, seems to be an extension of the (ice-covered) depression or graben. Thus, there may be a belt of low-lying land or even of frozen sea the whole way between the Ross Sea and the Weddell Sea on the opposite side of the continent. This is a theory advanced by the writer and others, but apparently demolished by the discovery of Amundsen's "Carmen Land" in 1912.

It is not possible yet to discuss adequately the other scientific results of the Expedition. Some of us feared that Byrd would rely entirely on air surveys, but the surface surveys of Dr. Gould and others show that Byrd realizes the limitations as well as the immense advantages of the airplane in the Antarctic. In a journey to the Rockefeller Range—in which Gould's airplane was destroyed in a blizzard—the rocks were found to consist of granites and similar materials. These are stated to be like those of the Alexandria Range and presumably like those of the basement rocks of the great mountains across the Ross Ice Barrier. It is an interesting fact, which I discuss in my recent book "Antarctic Adventure and Research," that the rocks on the Graham Land side of Antarctica (near South America) belong to one group (the Pacific type) while those of the Ross Sea belong to the other group (the Atlantic type). These two types contain different minerals which are also associated differently. If now the Rockefeller rocks contain felspathoids they will agree with the other rocks of the Ross Sea area. If they are unusually rich in quartz they will be more akin to the Pacific type. In the latter case we have some evidence for a structural connection between Byrd's region and Graham Land (and also with South America).

In his survey of the rocks at the lower end of the Liv Glacier, Gould has discovered carbonaceous shales which approach coal in composition. Coal has been found at the head of the Beardmore Glacier in 1908 and 1912, but Gould's discovery extends this potential Antarctic coal field possibly 150 miles to the east. It has been suggested that one of the world's largest coal fields occurs either in this great horst, or to the west of it under the Ice Plateau. Its present economic value is doubtful—but scientifically the presence of coal so near the Pole is of the greatest interest. It is not generally known that the present climatic zones of the world did not exist throughout most of the geological record. This record tells us something of the world's history during some 500 million years. Through all that long period the world for the most part enjoyed much more uniform climatic conditions than those which characterize it today. It seems likely that fairly temperate climates extended right to the Poles. So that the presence of valuable coal in Spitsbergen in latitude 78° north is interesting but not unexpected. There is no need to invoke a tropical climate to produce a coal vegetation—though clearly conditions near the Liv Glacier must have been very different some 150 million years ago (when coal vegetation was growing) than they are now. Indeed the most surprising result of the fairly complete geological record from Antarctica is that nowhere do we find any evidence of a Great Ice Age, such as that which today (*Turn to next page*)

Canada Receives Prehistoric Art

Archaeology

Replica of Ancient French Bison Given to Museum

CANADA, the Land of the Bison, has received a replica of the celebrated bison group which was modeled in clay by a first-rate artist of France some 30,000 years ago.

The original clay models were discovered in 1912 in a large cave of several chambers on the north slope of the Pyrenees in southern France. The entrance to the chamber in which they were found was blocked by stalactites that had been formed by slow natural processes operating through the long period of time that had elapsed since the artist left his work. The floor of the chamber bears the impress of naked human feet, mainly of the heel, and on the floor also is drawn an outline sketch of a bison.

Sketches of the bison and other animals are found on the walls of the cave. In one chamber were found the remains of bears, and the floor plainly showed their claw marks. The jaw bones of the bears when found in 1912 had been broken and the incisors removed, probably for decorative purposes.

Dr. Henry M. Ami, who arranged for the clay bison to cross the Atlantic, points out that Canada's real bison came from the Old World in prehistoric times. The real bison presumably reached America not across the Atlantic, but from the opposite direction, journeying eastward across Asia and entering Alaska.

Dr. Ami spent almost half of last year in France, excavating at important sites where prehistoric men once lived. From this expedition, he has obtained collections of flint tools and weapons, and the bones of animals that supplied food to the primitive Europeans. Some of these collections have been placed in French museums. Other collections are now being distributed to museums of Canadian universities and to the Canadian National Museum.

Dr. Ami holds the view that the Eskimos of northern Canada belong to the same family tree as some of these prehistoric Europeans whose art and industries are shown in the exhibits. According to this theory, one of the European races was driven eastward during the retreat of the northern ice sheet, when the animals wandered north. These people followed the reindeer, the great stag, the bison, musk-ox, lemming, marmot, and other animals until the chase led into northeastern Asia, and thence across into the New World.

Science News-Letter, June 21, 1930

Prehistoric Indian House Unearthed

Archaeology

THE complete plan of a big circular Indian house has been excavated in a cotton field in Mississippi, is the announcement made by Henry B. Collins, Jr., of the U. S. National Museum. Mr. Collins, who has returned from Mississippi bringing a drawing of the house plans, said that this is the first discovery showing clearly how the prehistoric Indians of the Southwest designed their buildings.

The house, which is in the frequently plowed cotton field of Claude Pepper near Deasonville, was recently recognized as an Indian site when bones and potsherds were dug up by two young men working for the Mississippi Department of Archives and History. These men, Moreau Chambers and James Ford, invited Mr. Collins to work with them in excavating the site.

The house plan shows three circles of post holes which were used for roof supports, Mr. Collins explained. The outermost circle is sixty feet in diameter. Tracing the circles with a string, as the Indians probably did in the first place, the archaeologists found that the circles were perfectly laid out. The Indian house builders dug the three circles in shallow trenches and set the posts firmly two feet deep within the trenches. The wall of the structure was very likely of wattle-work of reeds plastered with clay, Mr. Collins explained. Traces of a fire pit were inside the house, and also a square of post holes which provided additional roof supports and possibly set off an inner room.

The outermost trench was filled in with kitchen and household refuse, including bones of deer, bear, and smaller animals, fish jaws, clam and mussel shells, arrow points, bone scrapers and awls, one pipe and much broken pottery. Some of the pottery is a red and white kind heretofore found only in Arkansas. The trash of an Indian settlement was usually piled in a heap, and it is difficult to account for this use of it to fill the trench, Mr. Collins said.

Science News-Letter, June 21, 1930

Byrd's Discoveries—*Cont'd*

prevents the growth of any living plant higher than a moss. Nor does any living animal larger than an insect a few millimeters long permanently inhabit this great continent of five million square miles. For the discussion of these and numberless other scientific problems in meteorology, magnetism, glaciology, etc., the world awaits with the greatest interest the return of the Byrd Expedition.

Science News-Letter, June 21, 1930

FIRST GLANCES AT NEW BOOKS

SHORT TALKS ON SCIENCE—Edwin E. Slosson—*Century*, 281 p., $2. The marvel of science now allows those who have passed from the scenes of our daily life to talk to us from the motion-picture screen. As marvelous are books, created by centuries of writers, who with libraries as their rostrum can talk to us through the medium of cellulose and carbon. If a great man has done his work well, if he has left in the libraries of the world the essence of his contributions to civilization, then he will live forever in his influence on the millions unborn when he was alive.

No man has done more toward instilling in the layman an appreciation and understanding of science than Dr. Edwin E. Slosson. Through his numerous books, "Creative Chemistry," "Chats on Science," "Snapshots of Science," and others, he will continue to entertain and incidentally teach the multitudes.

With the idea of projecting his influence forward in time, now that he himself cannot do it, the writings that occupied much of his efforts for the last year of his life are gathered together in book form.

Working with Dr. Slosson in the upbuilding of Science Service to its present important position in science and journalism was a privilege and pleasure. His memory can best be honored by resolving that the great work to which he devoted the last decade of his life shall continue with the vigor and effectiveness that he would have wished.—Extract from the preface.

General Science
Science News-Letter, June 21, 1930

THE ART AND RELIGION OF FOSSIL MAN—G. H. Luquet, translated by J. Townsend Russell, Jr.—*Yale Univ. Press*, 213 p., $5. The cave paintings, carved Venuses, and other art works of the Old Stone Age are of great significance in showing the mental, emotional, and aesthetic state of men in that age. This work by a French philosopher and anthropologist contains a lavish collection of the famous examples of art from Spain and France and many less familiar specimens as well. The text describes and comments on these exhibits, explaining also M. Luquet's views on the origins of art and the functions which the engravings, paintings, and carvings served.

Archaeology
Science News-Letter, June 21, 1930

WIDER HORIZONS—Herbert Adams Gibbons—*Century*, 402 p., $3. This is a significant book because a well-equipped expert on current history sees through the veil of obscuring politics. As he expresses it: "Generals and statesmen, wars and international conferences, treaties and violations of treaties, new political institutions and boundary lines of recent creation in many countries, no longer loomed as the controlling influences in international relations." He writes not of government and the stuff of which history has been previously composed but of new measurements of time and space, new forms of motive power, the happier and more efficient world in which we live, cultural migration, growth and distribution of the human race, etc. Dr. Gibbons joins the scientific advance.

History
Science News-Letter, June 21, 1930

BOYS' BOOK OF EXPLORATION—J. Harris Gable—*Dutton*, 435 p., $5. Youths, thirsty for knowledge and eager to carry on their own exploration for information, will find here the story of the discovery of the world as it was accomplished by the great explorers of the past and the present.

Geography
Science News-Letter, June 21, 1930

THE WORLD, THE AIR AND THE FUTURE—Commander Sir Dennis Burney—*Knopf*, 357 p., 21s. The designer and constructor of the British airship R-100 surveys in this timely book the problems of aviation, with special consideration of airships and their relation to the problems of Great Britain. Commander Burney's discussion of the political and international aspects of airships holds that the development of civil aviation will help to build an international world order and bring about a United States of Europe and a unification of the Atlantic peoples.

Aeronautics
Science News-Letter, June 21, 1930

A SERIES OF EIGHT RADIO TALKS ON THE FAMILY—Manuel C. Elmer—*Univ. of Pittsburgh*, 73 p., 60c. Families, past and present, even future, are brought under the microscope in these radio talks. "Problem Parents and Problem Children" and "The Family Does Not Live on Bread Alone" are two of the especially thought-provoking topics of the series.

Sociology
Science News-Letter, June 21, 1930

ENERGY—Sir Oliver Lodge—*[illegible] than Cape & Harrison Smith*, 124 p., 60c. Energy is fundamental to the maintenance of the universe as well as modern civilization. It is but natural therefore that this small lucid explanation by a great personality in physics should give to the reader a new insight into the fundamentals of the present revolution in civilization.

Physics
Science News-Letter, June 21, 1930

TWO POLAR MAPS WITH TEXT—W. L. G. Joerg—*American Geographical Society*, 49 p., $5. Exploration by flying has so changed the aspects of the Polar region in the last few years that these two authoritative maps together with a brief history of Polar exploration since the introduction of flying by W. L. G. Joerg will be welcomed by all who desire to have accurate and concise current information on the two ends of the earth. Happily the maps are so cased that they may take a place among the books on a library shelf.

Geography
Science News-Letter, June 21, 1930

THE GREAT ASTRONOMERS—Henry Smith Williams—*Simon and Schuster*, 618 p., $6. From Eratosthenes to Shapley the great investigators of the universe are paraded in these pages for the enlightenment of non-scientific readers. Readable though it is, its workmanship is scholarly. The author's own sketches which are used nearly exclusively as illustrations are particularly effective when he presents composite pictures of great astronomers whose conventional portraits do not always agree. This book is not primarily about the stars themselves but about the procession of geniuses who have discovered mankind's place in the far-flung heavens.

Astronomy
Science News-Letter, June 21, 1930

A CALENDAR OF DOUBTS AND FAITHS—William Marias Malisoff—*Watt*, 359 p., $2.50. Those who like to reflect on the conflicts and coincidences in philosophies of science, religion, and art will be interested in Dr. Malisoff's keen analysis. Those who have never done much thinking on the subject will find here a sound starting point for their own speculations on themselves and the world they live in.

Philosophy
Science News-Letter, June 21, 1930